Shared viral vector facility for genetic manipulation of huamn ES cell

Grant Award Details

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Grant Type: Shared Labs

Grant Number: CL1-00500-1.1

Investigator:

Name:	Garry Van Gerpen
Institution:	Salk Institute for Biological Studies
Type:	PI

Award Value: $1,478,923

Status: Closed

Grant Application Details

Application Title: Shared viral vector facility for genetic manipulation of human ES cell

Public Abstract:

Human ES (hES) cells offer the opportunity to be converted into replacement tissues for diseased organs and provide cures for diseases like Parkinson's, diabetes, and a host of neurological disorders. Unfortunately due to political considerations, scientific space containing equipment and other resources provided by the federal government are off limits for work on unapproved hES cell lines. Space where unimpeded hES cell work can be carried out is a major limitation for many scientists at our institute to initiate scientific inquiry in the very exciting field of regenerative medicine. We are applying for funds for a Shared Research Laboratory Grant to work on non-federal government-approved hES cells, which are superior to the approved hES cell lines. Eighteen faculty here have no laboratory space in which to do research in hES cells. We are requesting funds to renovate and equip ~2,000 sq ft of independently-operated, stand-alone space which will include laboratory space for generating lentiviral vectors (LV) capable of delivering genes and/or small interfering RNA (siRNA) to manipulate hES cells, and tissue culture facilities to grow and propagate non-NIH approved hES cell lines. To study and to induce differentiation of hES cells to different lineages we will require the availability of tools that activate or suppress gene expression. Furthermore to correct a genetic defect, for instance a defective insulin gene that leads to type I diabetes, one needs to introduce a functional insulin gene in the regenerated pancreas from the ES cells of a diabetic patient. If the introduced gene is not integrated in the genome, it will be lost in the subsequent progeny. Thus the need for a delivery vehicle that will become part and parcel of the chromosome in both the progeny cells and the self-renewing cells. We have developed delivery vehicles based on retro- and lentiviruses that can safely and efficiently deliver and transcribe genes in both the embryonic and adult stem cells. We believe that we can provide such vectors to all the stem cell researchers in the neighboring institutions working on CIRM related hES cell projects, which will not only be cost effective, but accelerate the pace of science in the exciting field of hES cells. We plan to hire a full-time core director and 3 research assistants who will be responsible for setting up and maintaining the stem cell facility and managing the core facility for generating viral vector. We will offer a hands-on laboratory course to all participants in CIRM related research to generate retro- and LV, safety associated with use of these vectors and state-of-the-art methods to utilize hES cells. We hope to train the next generation of human stem cell biologists who will play an essential role in bringing the fruits of regenerative medicine to the people of California and the world.

Statement of Benefit to California:

Human embryonic stem (hES) cells offer the opportunity to be converted into replacement tissues for diseased organs and provide cures for diseases like Parkinson's, diabetes, and a host of neurological disorders. To realize the potential of this revolutionary concept, scientists must understand the basic mechanisms of how ES cells can become a liver, pancreatic cell, muscle, or neuron. What are the signals that trigger differentiation to a specific cell lineage and what molecular events must transpire to allow self-renewal of the ES cells? Eighteen faculty here wish to pursue answers to these fundamental questions. Several scientists want to understand the maintenance and self-renewal capacity of hES cells. Other investigators are proposing ways to induce hES cells to spinal chord or dopaminergic neurons. Converting hES cells to a variety of cell types will require genetic manipulation; therefore we are proposing the generation of delivery vehicles (vectors) that can be used to introduce or inactivate genes into hES cells. Because most of the scientists here do not have a facility to work on non-federally funded hES cell lines, we are requesting funds to build such a facilty. We believe that scientific work carried on hES cells will help to cure diseases like Parkinson's, Lou Gehrig's disease, and diabetes. The work proposed here will lead to establishing biotech companies in California to expand basic research into products thereby not only improving the health of Californians, but also become a significant economic engine. The facility we are proposing will provide gene delivery vehicles to scientists from neighboring institutions working with CIRM funds that will be cost effective and establish collaborations. The facility will also train the next generation of stem cell biologists to continue this very important scientific work and keep California in the forefront of biomedical research.